

**On *Cyathura muromiensis* (Crustacea: Isopoda: Anthuridae)
from reservoirs of the reclaimed land of Isahaya Bay, Nagasaki, western Japan ***

Noboru Nunomura
Noto Marine Laboratory
Institute of Nature and Environmental Technology, Kanazawa University
Ogi, Noto-cho, Ishikawa 927-0553, Japan

**長崎県諫早湾干拓地調整池から発見された
ムロミスナウミナナフシ (等脚目: スナウミナナフシ科)**

布村 昇
金沢大学環日本海域環境研究センター臨海実験施設
927-0553 石川県鳳珠郡能登町小木

2002年から2012年まで東幹夫博士や東北大学総合学術博物館の佐藤慎一博士らによって長崎県諫早湾干拓地調整池でのベントスの生態学的調査の際に採集されたウミナナフシをムロミスナウミナナフシ *Cyathura muromiensis* Nunomura, 1974と同定したが、オス第2腹肢の交尾針の先端の掌状突起の形態、第1小顎が長く、歯数が少ないこと、胸脚前節後縁の剛毛が少ないこと、尾肢内肢が短いこと、大顎鬚が短いことなどの差異がみられたので、その形態を記載した。また、従来メスや若個体の記載なかったので、その形態も報告する。標本は東北大学博物館と富山市科学博物館に保管される。

キーワード: ムロミスナウミナナフシ, 諫早湾, 変異, 等脚目, スナウミナナフシ科

Key words : *Cyathura muromiensis*, Isahaya Bay, variation, Isopoda, Anthuridae

Hitherto, 30 species of the genus *Cyathura* (Isopoda, Anthuridae) have been recorded as valid and seven species from Japan. But the knowledge on the taxonomy of this group is insufficient. (Nunomura, 1974, 1977, 1992, 2002; Nunomura and Hagino, 2000; Horikoshi, 2012).

During a series of ecological survey carried out from 2002 to 2012 in reservoirs of reclaimed land of Isahaya Bay, a part of the Ariake Sea, west Kyushu, southwestern Japan. Dr. Azuma, a professor emeritus at of Nagasaki University and Dr. Shinichi Sato of Tohoku University (Present: Shizuoka University) had collected certain amount of anthurid specimens. Through their courtesy, these specimens were sent to me for identification.

At the results of the study of mine, the specimens were identified as *Cyathura muromiensis*, but several differences are recognized. In addition there has been no description of female. Therefore, I will describe main features of a males, several females and a juvenile collected from Isahaya Bay. The material will be deposited at Toyama Science Museum, Toyama (TOYA Cr-23625~23645) and Tohoku University Museum (TUMC-111508~111519). Size of specimens is indicated by the body length (BL) measured from the midpoint of the anterior margin of the head to the midpoint of the posterior margin of the pleotelson.

*Contributions from Toyama Science Museum, No. 474

Order Isopoda
Family Anthuridae

Cyathura muromiensis Nunomura, 1977

(Japanese name: Muromi-suna-uminanafuhi, new)

(Figs.1-3)

Cyathura muromiensis Nunomura, 1974, p. 71, fig. 1 (mouth of Muromi River; Fukuoka City, Fukuoka Pref.)

Material examined: All the materials from reservoirs of reclaimed land of Isahaya Bay, part of the Ariake Sea, Isahaya-shi, Nagasaki. Among 24 stations, *Cyathura muromiensis* was collected from the following six stations. Longitude and latitude of all the stations show the intended spots.

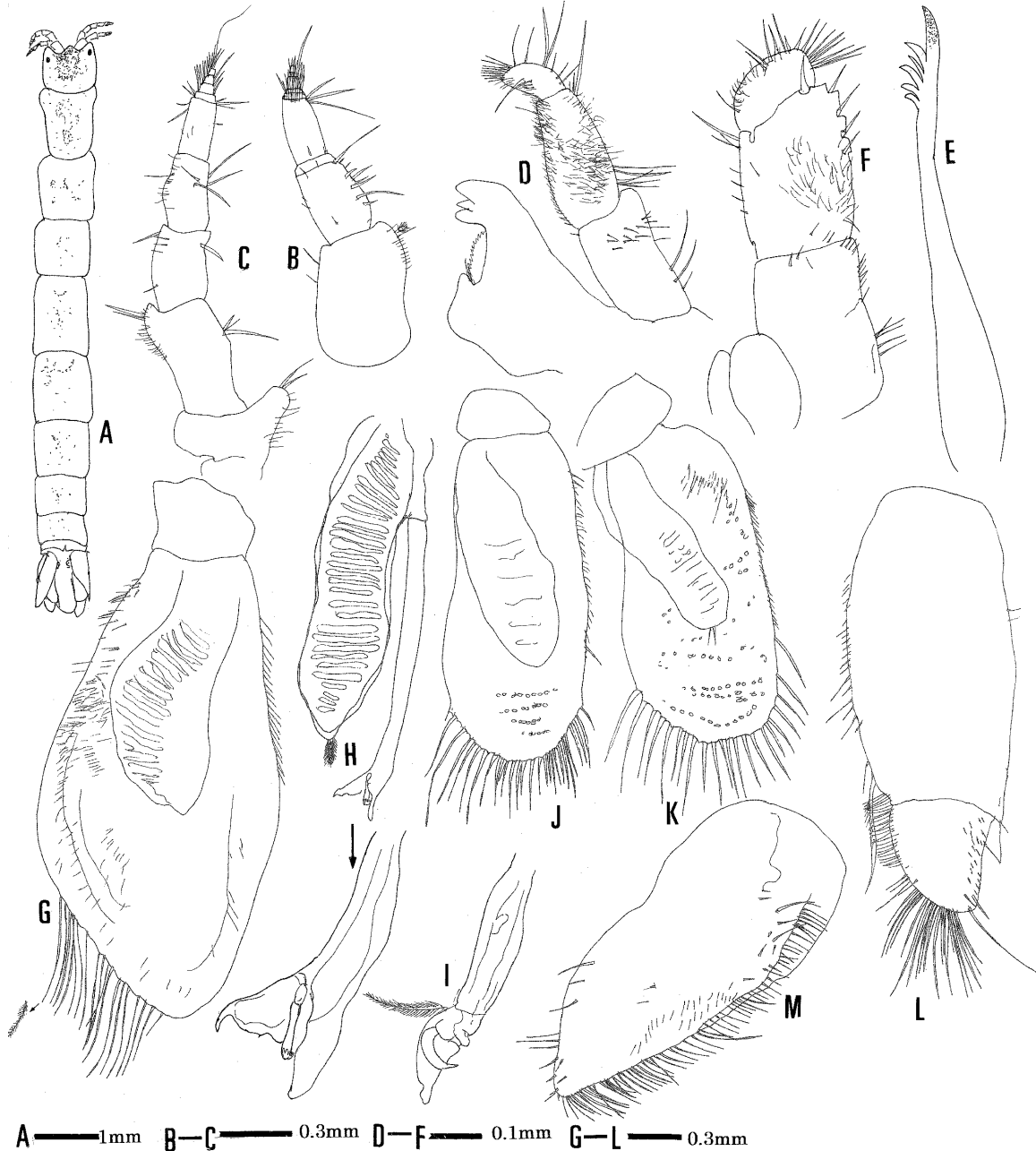


Fig. 1 A male of *Cyathura muromiensis* Nunomura, 1977

A, Dorsal view; B, Antennule; C, Antenna; D, Mandible; E, Maxillula; F, Maxilliped; G, Pleopod 1; H, Right second pleopod; I, Appendix masculina of left second pleopod; J, Pleopod 4; K, Pleopod 5, L, Uropod endopod; M, Exopod of the same (All: A male specimen from Isahaya).

Station C1 (32° 52'10.6N ; 130° 07'22.2E)

1 young ♀, mud sand with sand, 2.2m in depth (salinity 0‰) , 5, Aug. 2003.

Station C4 (32° 50'49.6N ; 130° 09'35.7E)

5 ♀ ♀, sand bottom with shells and mud, 0.5m in depth,(salinity 0.6‰), 8, June 2010.

Station C7 (32° 52'41.1N ; 130° 53'06.4E)

1 ♀, 1.4m in depth (salinity 0.9‰) 4, Sep. 2002; 1 young ♀, gray clay bottom, 1.2m in depth (salinity 0-0.1‰) 5, Aug. 2003 ; 4 ♀ ♀, shell sand with mud, 0.9m in depth (salinity 0.8‰) 9, Aug. 2004; 1 ♀, hard black clay bottom 0.6m in depth (salinity 0.3‰), 8, June 2010.

Station C12 (32° 50'39.9N ; 130° 10'52.2E)

1 ♀ 0.7m in depth fine sand bottom with shells and mud, (salinity 0.8‰) 9, Aug. 2004; 1 ♂, sand and mud bottom, 1.1m (salinity 0.5 ‰), 14, June, 2009 ; 1 ♀ shell sand with sand, 0.6m in depth (salinity 1.0-1.1‰) 15, Apr. 2007; 6 ♀ ♀, sand and mud bottom, 0.9m in depth,(salinity 0.8‰) 14, June 2008 ; 2 ♀ ♀ bottom, 1.1m in depth (salinity higher than 0.5‰) 14, June 2009 ; 5 ♀ ♀ ooze bottom, black clay bottom with shell and sand, 0.6 m in depth (salinity 0.5‰), 8, June, 2010; 1 ♀, gray clay bottom, 0.9-1.3m in depth (salinity 0.9‰) 8, June, 2011; 2 ♀ ♀ brown mud bottom with shells, 1.2m in depth,(salinity 1.2 ‰) 8, June 2012; 2 ♀ ♀, shell sand with sand, 0.6m in depth (salinity 1.0-1.1‰), 15, Apr. 2007.

Station C16 (32° 50'48.0N ; 130° 10'18.0E)

3 ♀ ♀, mud sand with shells and sand, 0.9m in depth (salinity 0.6‰), 8, June 2010; 9 ♀ ♀ brown mud bottom with shells, 1.1m in depth (salinity 1.2‰) , 10, June 2012.

Station C17 (32° 51'22.0N ; 130° 09'50.0E)

2 ♀ ♀, coarse sand with shells, 1.1m in depth (salinity 0.7-0.8), 8, June 2011.

Redescription of male (7.6mm in body length) : Body 10.5 times as long as wide. Color dull yellow, with irregular darker patterns on dorsal surface. Cephalon almost square, medial process equally protruded. Eyes small and ocelli not discerned. Mutual length of cephalon, seven pereonal somites and pleonal somite is $c < I > II = III < IV = V > VI > VII > pl$. Pleonal segments 1-5 fused in dorsal area, only sixth segment distinct. Pleotelson with a pair of relatively big statocysts.

Antennule (Fig. 1B) with 3 peduncular and 5 short flagellar segments. Antenna (Fig. 1C) with 5 peduncular and 5 short flagellar segments.

Mandible (Fig. 1D): pars inciva three-toothed; lamina dentata with small 16-17 teeth; palp 3-segmented, second segment with 7 long setae and many short setae; terminal segment with 20 longer setae and some short setae. Maxillula (Fig. 1E) curved medially and ending to a strong teeth and 6 weaker teeth. Maxilliped (Fig. 1F) with 2-segmented palp; terminal segment round.

Pereopod 1: (Fig. 2A): basis triangular, with a group of short setae on inner distal area and a few of setae on outer margin; ischium a little longer than basis, with many setae on both margins; merus 0.35 times as long as wide, with many setae on outer margin; carpus triangular and slender, with many short setae on inner margin; propodus stout, with a notch on inner margin; dactylus relatively short, 0.45 times as long as propodus, with a series of short half as long an inner side.

Pereopods 2 and 3 (Fig. 2B and C) similar and slenderer than pereopod 1: basis 2.5 times as long as wide, with a group of setae and a stout plumose seta on outer side; ischium a little shorter than basis, with 4-12 longer setae and several setae on inner margin and 3 longer and many shorter setae on outer margin; merus 0.6 times as long as ischium, with many setae including 3-4 longer ones on inner margin; carpus triangular, with 2-3 longer setae on inner distal angle and several setae on inner margin; propodus slenderer than that of pereopod 1, with 5 setae including a serrated seta; dactylus 0.6 times as long as propodus.

Pereopod 4: (Fig. 2D): basis 2.1 times as long as wide, with many setae on both margins and a long seta at inner distal angle; ischium as long as basis, with 14 long setae on inner margin and many short setae on inner margin and 3 strong setae and many short setae on outer margin; merus half-length of ischium, with 12 long setae

and many short setae on inner margin and 3 strong setae on distal half of outer margin ; carpus round, with 4 long setae and many short setae on inner margin and 2 strong setae and a stout seta on inner margin; propodus 1.8 times as long as carpus, with 5-6 relatively long setae on inner margin and a serrated strong seta on distal inner part and 6 setae on outer margin; dactylus 0.75 times as long as propodus.

Pereopod 5 (Fig. 2E): basis twice as long as wide, with a seta at inner distal angle and many setae both margins ; ischium as long as basis, with 5-6 setae and on inner margin 2 long seta on outer margin; merus with 8-9 long setae on inner margin 2 long setae and many short setae on inner margin; carpus with 6 longer setae and many short setae on inner margin; propodus with a serrated stae at inner distal angle and many setae on inner margin; dactylus 0.6 times as long as propodus.

Pereopod 6 (Fig. 2F): basis twice as long as wide, with 9 long setae on outer margin; ischium a little shorter than basis, with 10-11 setae; merus 0.6 times as long as wide, with 11 setae; carpus rectangular, with 5 long setae and many short setae and 3 setae on outer margin; propodus 2.8 times as long as carpus, with a serrated seta at inner distal margin and many short setae on inner margin; dactylus 0.6 times as long as propodus.

Pereopod 7 (Fig. 2G): basis 2.4 times as long as wide, with a seta at inner distal angle and many setae on both margins; ischium with 7-8 long setae on inner margin and 4 setae and several short setae on outer margins; merus, with 15-16 setae on inner side and 5-6 setae on outer area; carpus trapezoid, with 5 setae on inner margin and a seta on outer margin; propodus rectangular, twice longer than carpus, with 2 setae and a stout on inner margin and a serrated strong seta on distal inner part; dactylus 0.6 times as long as propodus.

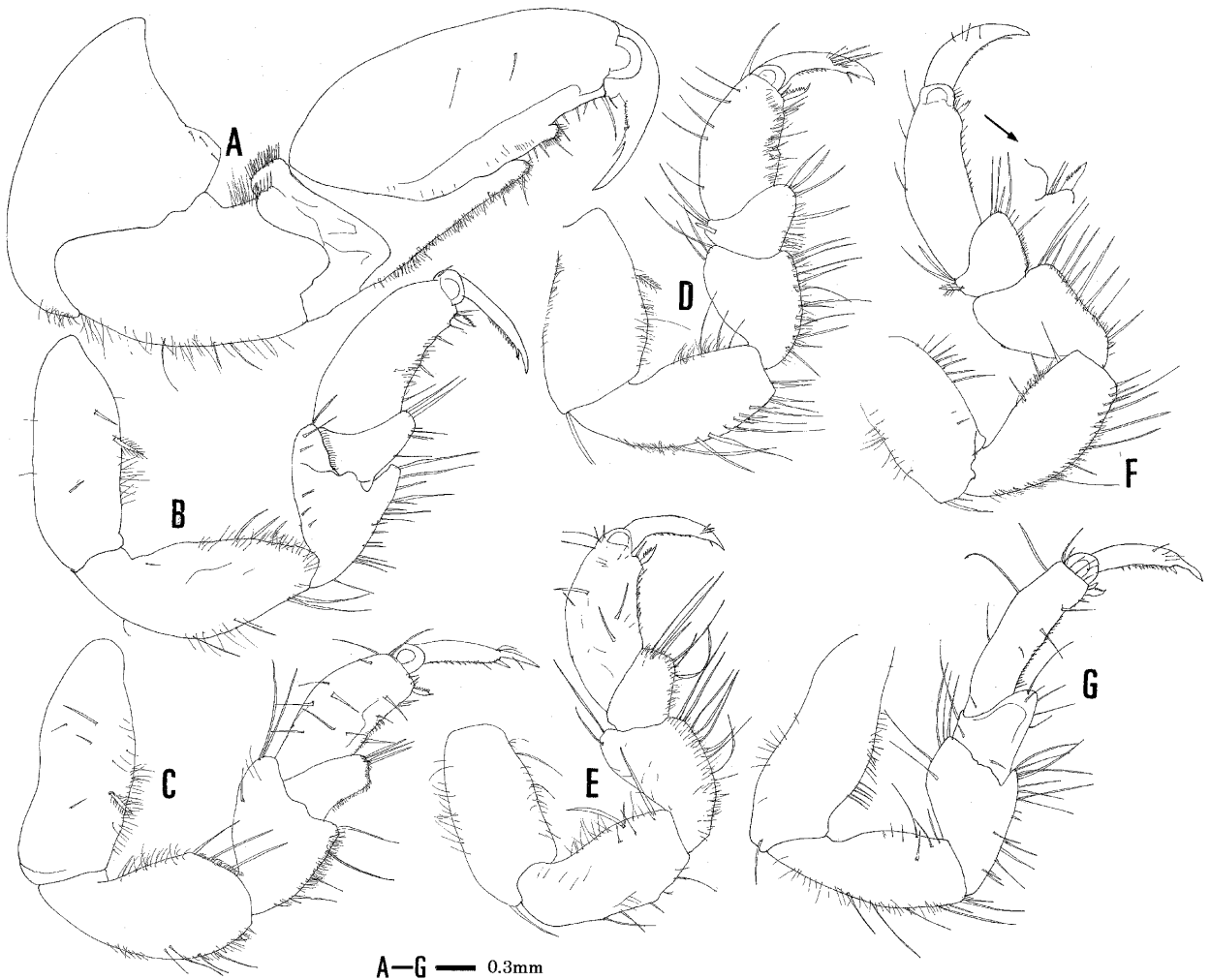


Fig. 2 A male of *Cyathura muromiensis* Nunomura, 1977

A-G, Pereopods 1-7 of male (All: A male specimen from Isahaya).

Pleopod 1 (Fig. 1G) stout and operculiform: exopod bearing more than 18 setae around margin; endopod reduced to narrow plate.

Appendix masculin pleopod 2: right (Fig. 1H) fork-shaped, with hook-crowned rod originate between two lateral lappets. Appendix masculina of left pleopod 2 (Fig. 1I) with a finger-like process, an acute process and a plumose seta near the tip; the left one is might be a kind of deformity.

Pleopods 3-5 similar in shape (Figs 1J-K): basis rectangular; endopod sinuate; exopod rectangular, with 23-27 setae on distal margin.

Uropod (Fig. 1L and M): basis rectangular with a long seta on basal part of lateral margin; endopod semicircular, with more than 45 setae around the margin; exopod 23 times as long as wide, apical margin narrow but round, with more than 65 setae on inner margin and 12-14 setae on outer margin.

Description of female (10.5 mm in body length): Body 10 times as long as wide. To compare with male, cephalic and thoracic appendages will be described.

Antennule (Fig. 3A) composed of 3 peduncular segments and 3 flagellar segments. Antenna (Fig. 3B) composed of 5 peduncular segments and 4 short flagellar 6 minute segments.

Mandible (Fig. 3C): lamina dentata with small 17-18 teeth; palp 3-segmented, second peduncular segment with 2 strong setae and some short setae; terminal segment with 13-14 long setae on lateral side and terminal palpal segment with 7 setae on apical margin. Maxillula (Fig. 3D) with a stronger and or 6 weaker teeth on apical area. Maxilliped (Fig. 3E) as in male.

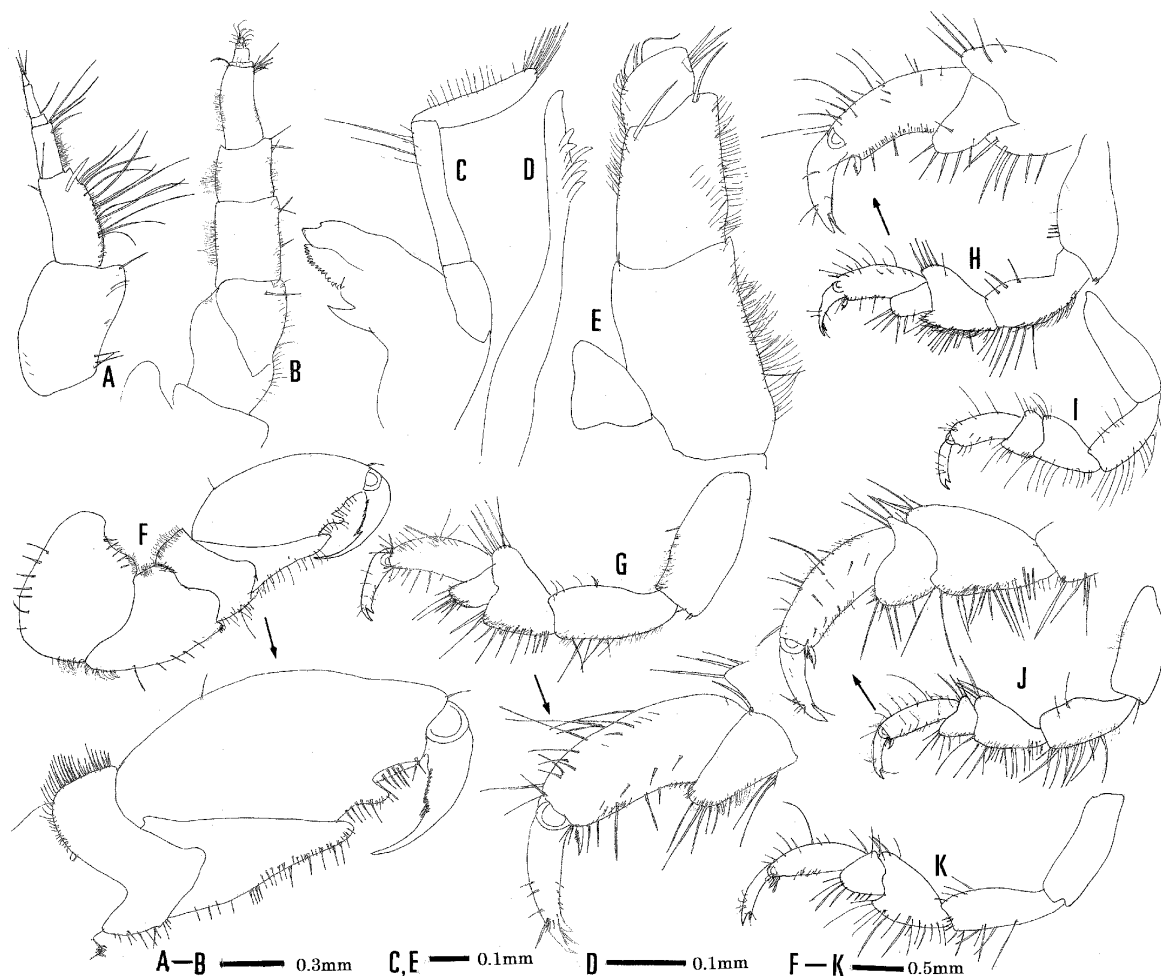


Fig. 3 Females of *Cyathura muromiensis* Nunomura, 1977

A, Antennule; B, Antenna; C, Mandible; D, Maxillula; E, Maxilliped; F-I, Pereopods 1-4, J-K, Pereopods 6-7 (All: Female specimens from Isahaya).

Pereopod 1 (Fig. 3F): basis stout, with 7 setae on inner margin and many short setae on outer margin; ischium with 5 setae and many short setae on inner side; merus short with many short setae on both margins; carpus triangular, 0.6 times as long as wide; propodus with a process on inner margin; dactylus 0.55 times as long as propodus.

Pereopod 2 (Fig. 3G): ischium with 3-5 setae and many short setae on inner margin; merus almost with 12 long setae on inner margin and 5 setae on outer margin; carpus with 7-8 long setae and many short setae on inner margin; propodus with a serrated seta at inner distal angle; dactylus 0.6 times as long as propodus.

Pereopod 3 (Fig. 3H): ischium with 6-7 long setae and many short setae on inner margin; merus two-thirds as long as ischium, with 6-7 long setae and many short setae on inner margin and 3-5 long setae on outer margin; carpus narrow, with 6-7 setae; propodus with a serrated seta at inner distal angle; dactylus 0.6 times as long as propodus.

Pereopods 4-6 (Fig. 3J): basis 2.3 times as long as wide and a relatively long seta at inner distal angle; ischium as long as basis, with 11-12 long setae on inner margin; merus with 17-18 long setae and many short setae on inner margin and 4 setae on outer margin; carpus rounded trapezoid, with 6 long setae and many shorter setae on inner margin; propodus with a serrated seta at inner distal area; dactylus 0.6 times as long as propodus.

Pereopod 7 (Fig. 3K): basis 2.8 times as long as wide; ischium with 7-8 relatively long setae on inner area and 4 setae on outer area; merus a little shorter than ischium, with more than 15 setae on inner margin; carpus rounded trapezoidal, with 8-9 setae on inner margin and 4-5 setae on outer margin; propodus with a serrated seta at inner distal angle and 7-8 setae on outer margin. dactylus 0.6 times as long as propodus.

Description of a young female considered to be postmanca stage (5.4mm in length)

Body (Fig. 4A) 8.0 times as long as wide. Color pale yellow. Cephalon rectangular.

Anterior margin of cephalon with medial rostral pointed lateral margin round. Mutual length of pereopod somites approximately 6: 7: 7: 8: 7: 6: 4. Eyes, with 9-12 ommatidia; each ommatidium separated each other. Pleon fused in only in medial portion the lateral area. Statocysts big. Pleotelson (Fig. 4O) relatively narrow, 3.0 times as long as wide.

Antennule (Fig. 4B) with 3 peduncular and a flagellar segment. Antenna (Fig. 4C) with 5 peduncular and a flagellar segments.

Mandible (Fig. 4D): pars incisiva with 3 notches, lamina dentate with 19-20 small teeth; palp 3-segmented, second segment with five strong setae and many short setae; segment with 3 setae at the tip. Maxillula (Fig. 4E) curved medially and ending to a strong teeth and 5 weaker teeth. Maxilliped (Fig. 4F) 3-segmented; basal two segments rectangular, second segments with 4 stronger setae and many setae; terminal segment round, with 15-16 stronger setae and many weaker ones.

Pereopod 1 (Fig. 4G): basis triangular; ischium as long as wide, merus rectangular, without setae; carpus triangular, 1.5 times longer than merus, 2 with setae and many short setae; propodus stout without distinct protrusion and 9-10 setae on inner margin; dactylus 45 % as long as propodus.

Pereopod 2 (Fig. 4H): merus tapering toward the tip; carpus round, with 3 setae on both margins; propodus slenderer than that of pereopod 1; dactylus 0.7 times as long as propodus.

Pereopod 3 (Fig. 4I): basis with a seta on inner margin and a robust seta on outer area; ischium as long as basis; merus, with 6-7 setae on inner margin, tapering toward the tip; carpus round with 3 setae on inner margin and outer margin propodus slenderer than that of pereopod 1; dactylus 0.7 times as long as propodus.

Pereopods similar 4-6 (Fig. 4J): basis with 2 setae and ischium with 5 setae; merus tapering toward the tip; carpus round with 3 setae on inner margin; propodus round, with 5 setae including a serrated one; dactylus 0.7 times as long as propodus.

Pereopod 7 (Fig. 4K): not fully developed, reduced without setae; dactylus 0.55 times as long as propodus.

Pleopod 1 (Fig. 4L): with operculiform exopod; margin bearing 15-17 nine setae; endopod reduced to small and narrow plates.

Pleopod 2(Fig. 4M): with elliptical, margin bearing nine setae; endopod reduced to small and narrow plates; exopod with 8 setae.

Uropod (Fig. 4N): basis rectangular, endopod lanceolate, with about 10 long setae on distal area and many short setae.

Remarks: The present material was identical with *Cyathura muromiensis* Nunomura, 1974 from Amakusa. But some differences in some features: (1) shape of tip of male appendix masculina, (2) longer maxillula (3) less numerous teeth of maxillula, (4) less numerous setae on outer area of propodus of pereopods, (5) shorter endopod of uropod and (6) shorter palp of mandible.

As Horikoshi (2012) pointed out, *Cyathura muromiensis* shows high variation in some features. The present specimens collected from Isahaya Bay are also considered to be within the range of the species. I, therefore, redescribed a male, several females and a juvenile.

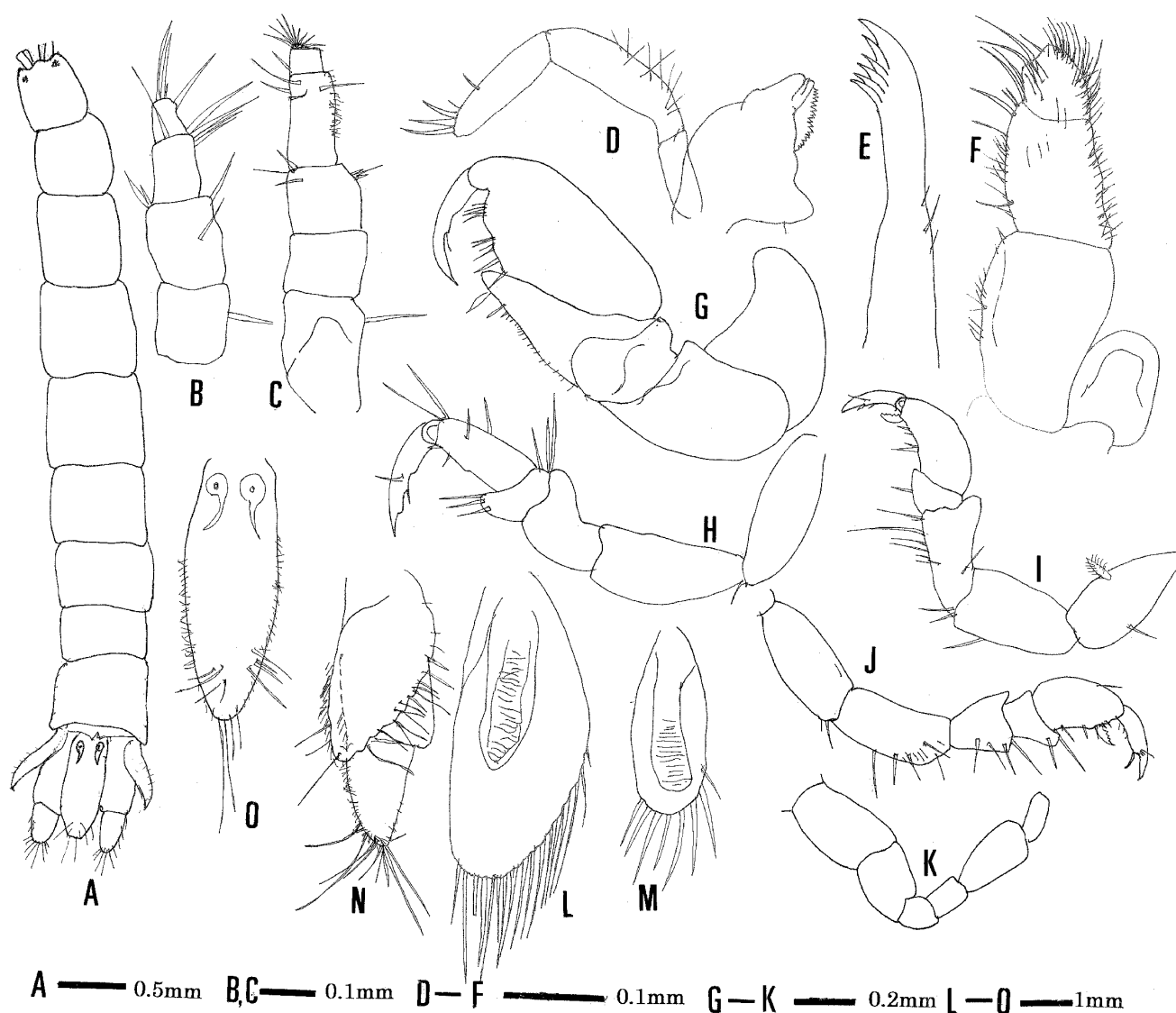


Fig. 4 A young female of *Cyathura muromiensis* Nunomura, 1977

A, Dorsal view; B, Antennule; C, Antenna; D, Mandible; E, Maxillula; F, Maxilliped; G-J, Pereopods 1-4; K, Pereopod 7; L, Pleopod 1; M, Pleopod 2; N, Uropod; O, Pleotelson (All: A young female specimen from Isahaya).

Acknowledgements

I wish to express my sincere gratitude to Dr. Mikio Azuma, Professor Emeritus, Nagasaki University, for his kindness in giving me a chance to examine these specimens, to Dr. Shin'ichi Sato, Tohoku University Museum (present: Shizuoka University), for collecting specimens and for his useful advices concerning data including environments of sampling sites.

References

- Horikoshi, A., 2012. Taxonomical and ecological studies on *Cyathura muromiensis* (Crustacea: Isopoda) in the intertidal flats of Tokyo Bay: a thesis for a doctor's degree of the University of Tokyo.
- Horikoshi, A., Aoki S., Okamoto K., 2012. Distribution and habitat characteristics of *Cyathura muromiensis* (Crustacea: Isopoda) in the Tidal Flats of the Tama River Estuary, Tokyo Bay, Japan. *Jap. Jour. Benth.*, 66(2): 71-81.
- Nunomura, N., 1974. A new anthurid isopod from the estuary of the Muromi River, northern Kyushu, Japan. *Bull. Osaka Mus. Nat. Hist.*, 28: 13-16.
- Nunomura, N., 1977. Marine Isopoda from Amakusa, Kyushu (1). *Publ. Amakusa Mar. Biol. Lab.* 4(2), 71-90.
- Nunomura, N., 1992. Anthuridea (Crustacea: Isopoda) from the Ryukyu Archipelago. *Bull. Toyama Sci. Mus.*, 15: 47-56.
- Nunomura, N., 2001. A New Species of the Genus *Cyathura* (Crustacea: Isopoda) from the Lake Shinji, Shimane Prefecture, western Japan. *Bull. Toyama Sci. Mus.*, 24: 19-23.
- Nunomura, N., 2006. Marine Isopod Crustaceans in the Sagami Sea, Central Japan. *Mem. Natn. Sci. Mus. Tokyo*, 41:7-42.
- Nunomura, N. and M. Hagino, M., 2000. A new Species of the Genus *Cyathura* from the Lake Kasumigaura. *Bull. Toyama Sci. Mus.*, 23:5-9.
- Sato, S., 2006. Drastic change of bivalves and gastropods caused by the huge reclamation projects in Japan and Korea *Plankton Benthos Res.*, 1 (3):123-137.